Supporting Young Children's Math Development at Home

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Many young children in the United States do not demonstrate age-appropriate math skills (Galindo & Sonnenschein, 2015; U.S. Department of Education, 2015). In 2015, only 40% of U.S. fourth graders scored at or above the proficient level in mathematics (U.S. Department of Education, 2015). Early math competencies put children on the most advantageous trajectory for later math success (Duncan et al., 2007; Jordan, Kaplan, Ramineni, & Locuniak, 2009). Without a strong foundation in early math, children are likely to struggle because math concepts are hierarchical and become increasingly abstract and complex. Therefore, we need to find effective ways to foster children's early math skills. One such way is focusing on what parents can do at home with their young children (Sonnenschein & Galindo, 2014). School psychologists are ideally suited to facilitate parents' knowledge of what they can do with their children and to give teachers guides for working with parents. In what follows, we provide suggestions about what parents can do at home to foster their children's math development that school psychologists can use when working with parents and teachers.

Parents already engage in many math-related activities at home as part of their everyday routines and can serve as important role models for their children. The extent to which children observe their parents doing math activities is related to the frequency that their children engage in math activities, which, in turn, is related to their early math skills (Sonnenschein et al., 2012; Sonnenschein, Metzger, & Thompson, 2016). Beyond serving as role models, parents should point out to their children the different ways they use math in their everyday activities. For example, a parent could describe measurement during cooking or distance and time while traveling. Making math relevant to daily life is an important part of creating a home learning environment that fosters math development.

In addition to modeling and talking about math, parents can foster their children's math through simple activities. Early math activities can be integrated relatively easily into what parents are already doing at home with their children. We provide below descriptions of the early math skills children are expected to have upon entry to kindergarten and simple activities that can be used to foster these skills. We define math in keeping with the Maryland College and Career Ready Standards for Mathematics (MCCRS) as these standards align with the Maryland's Kindergarten Readiness Assessment (KRA). MCCRS includes five core domains of math: counting and cardinality, operations and algebraic thinking, numbers and operations in base ten, measurement and data, and geometry. These core domains remain constant as children progress through school; however, the skills included within each domain build upon each other and become more complex as children develop.

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Counting and Cardinality

Most of the specific math skills kindergarteners are expected to know fall under the domain of counting and cardinality. Counting skills include counting to 20, counting objects (one-to-one correspondence), ordering number cards (number sequence), identifying a small number of items without counting (subitizing), and understanding that quantity does not change regardless of how a set is arranged (number conservation). Cardinality is the understanding that the last object or item counted represents how many objects/items are in the set.

Counting and cardinality can be easily integrated into daily living activities. For example, children can count their toys as they clean up or count how many steps it takes to walk from the kitchen to their bedroom. Parents can point out numbers (such as the numbers on a clock) or ask . In the car, parents can have children read the numbers on license plates or count passing cars. Parents should ask, "How many?" after a child has counted to reinforce the idea of cardinality.

Games are also helpful for developing counting and cardinality kills. Counting and cardinality can be found in commercially available games like Trouble, Hi Ho Cherry-O, and Chutes and Ladders. Have children identify the number on the die or spinner when they take their turn. Then have them count aloud while they move their piece. As children become more familiar with larger numbers, they can their children to find other numbers throughout the day. In the grocery store, parents can ask children to find numbers while shoppingread the numbers written on the Chutes and Ladders squares. Dice and dominoes are also useful for helping children gain familiarity with numbers and developing their number skills. Active games which involve numbers, like jump rope, hopscotch, or clapping games can also foster counting skills.

Operations and Algebraic Thinking

Kindergartners will be expected to solve simple addition and subtraction (totals less than 5) problems using objects for the KRA. They will be expected to manipulate objects to break down numbers (1 and 2 objects = 3 objects) or to complete a set (3 objects and __ objects = 5 objects). Parents can have their children do simple addition and subtraction problems at home using concrete, everyday items, such as setting the table for dinner. Children can be asked to take out the correct number of plates or utensils. Parents can ask questions like, "How many more plates do we need?"

During play, parents can use toys and make statements like, "I'm going to give you one of my cars, let's count how many cars you have now." Songs and rhymes that incorporate counting up or counting down can also be useful for teaching early addition and subtraction. For example, songs like Five in the Bed or Teasing Mr. Crocodile integrate counting down from five. Parents can encourage their children to use their fingers to help with counting while they sing to reinforce these skills.

Numbers and Operations in Base Ten

For preschoolers, this domain focuses on gaining a firm foundation of the numbers 1-10. This is the first step to learning about place value. Children need to begin to understand that "ten" is made up of 10 "ones." Knowledge of base ten is not directly assessed on the KRA, however, it is never too early to start exploring these ideas. Counting fingers and toes is a great way to emphasize the numbers 1-10. Additionally, parents can use coins to talk about decomposing the number ten (e.g., 10 pennies are equal to 1 dime). Parents can play store with their children using pennies and have them "purchase" toys for differing amounts of pennies. During play, they can talk about how many toys they can buy with 10 cents.

Measurement and Data

The primary skills in this domain involve classifying or sorting data and beginning to work with measurement. Kindergartners will be expected to sort objects by their features (e.g., shape, color, size) or identify the feature by which objects have been sorted. They will also be expected to order objects by some measurable feature (e.g., bigger to smaller). Additionally, kindergartners should be able to compare objects and use language like more than/less than, longer/shorter, and heavier/lighter. Kindergartners are not expected to use rulers, but they will be expected to measure objects using non-standard measurement tools (e.g., measuring a pencil with paper clips, pieces of candy, etc.).

Daily living activities like cooking and doing chores can teach children early measurement. In the kitchen, children can begin experimenting with measurement using spoons or cups. Children can sort utensils, laundry, or toys as they put them away.

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During play, children can use non-standard measurement tools. Parents can ask children to answer questions like, "How many blocks tall are you?" Card and dice games are helpful for talking about number magnitude (e.g., more/less). War is a simple card game that can help children develop magnitude comparison skills. Additionally, several inexpensive sorting games, such as Ready Sets Go or Ready Set Woof, are commercially available.

Much of helping children develop skills in this domain is about fostering their knowledge and use of appropriate language. Parents should use words like heavier/lighter, taller/shorter, more/less, etc. to emphasize comparisons. When children are helping with tasks, parents can ask questions like, "Can you hand me the biggest bowl?" or "Can you put the smaller forks on the table?"

Geometry

Early geometry skills focus on learning to name and identify two-dimensional shapes like circles, squares, and triangles. Children also need to realize that shapes of different sizes, orientations, and dimensions are similar. For example, they should be able to identify a rectangle whether it is aligned vertically or horizontally. Children should be able to recognize that a circle is like a sphere and use informal names to identify three-dimensional objects (e.g., box for cube, ball for sphere).

Throughout the day, parents can draw children's attention to shapes found in the environment. For example, on a walk parents can point out that wheels are circles and then have children find other circles in the environment. Parents also can have children draw shapes or make them with their fingers or bodies. Commercially available games like Perfection or Tangrams also can help children learn to identify simple and more complex shapes.

Geometry skills for older children focus primarily on spatial awareness and reasoning. Preschool children can play with puzzles and blocks/Legos to help build early spatial skills. Parents might ask children to describe the features of their block/Lego creations. Children can describe the size of their creation or the shapes they used to build it.

Conclusion

This article provides information for school psychologists to share with parents and teachers about fostering children's math skills at home. Children learn best when they are engaged and having fun. Parents are well-suited to support their children's early math development by integrating early math skills into daily living activities and play.

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